background is not a plane as in the convex mirror, but the surface of a sphere, and that the proportion in which the images, as they approach the spherical surface contract, has a different mathematical expression."

But in reality these differences are so fundamental as to make all the difference between Euclidean and non-Euclidean; for the changed measure for distance in the mirror world is still Euclidean, parabolic, using an imaginary conic in the plane background as 'absolute' in Cayley's sense.

Thus Helmholtz reproduced the old but false theorem that in space of positive curvature two geodetic lines, if they in general cut, must necessarily cut in *two* points. He never attained the conception of single elliptic space, the type-form, but speaks only of 'spherical space of three dimensions.'

It is to be hoped that Professor Willson's book may hasten the day in America when courses in descriptive geometry and pure projective geometry, no longer confined to science schools, may be available in every college, and when there may be a more adequate realization of the power of spatial imaging as an instrument in scientific research.

GEORGE BRUCE HALSTED.

AUSTIN, TEXAS.

Chapters on the Natural History of the United States. By R. W. SHUFELDT, M. D., etc. New York, Studer Bros. 1897. Pp. 480.

This volume is a collection of articles, most of which were published originally in 'Shooting and Fishing' and other periodicals, and now reappear, revised and somewhat expanded. A wide range of topics is covered—insects, crustaceans, fishes, amphibians, reptiles, birds and mammals occupy one or more chapters each, by far the larger space being given to birds. As a rule, each chapter treats some general subject, such as 'Crayfish and Crabs,' 'Gulls and their Allies,' 'The American Warblers and Sparrows,' passing the whole group in review, mentioning some of its more striking forms, and giving detailed descriptions of one or two species, with extended accounts of their habits, these latter often augmented by quotations of considerable length from various well-known authors. The anatomy of the animal under consideration is occasionally touched upon and questions of classification are frequently discussed—matters which, it may be feared, will not prove very interesting to the general reader, for whom the work is intended.

The book is illustrated with a hundred and thirty figures, many of them occupying full pages. Nearly one-half are reproductions of photographs of living animals, and are worthy of considerable study for the light they throw upon the possibilities and the difficulties in the use of photography for zoological illustration.

C. F. B.

SOCIETIES AND ACADEMIES.

BIOLOGICAL SOCIETY OF WASHINGTON, 287TH MEETING, SATURDAY, FEBRUARY 26.

DR. E. A. DE SCHWEINITZ presented a paper on 'The Treatment of some Animal Diseases with Antitoxic Serums,' briefly reviewing the work as carried on in the Bureau of Animal Industry some years ago for the purpose of treating animals with the poisons formed by the swine plague and cholera suis germs. This work was fairly successful from an experimental standpoint, but did not seem to warrant practical use in the field on account of many difficulties which might arise. The preliminary experiments made in the Biochemic Laboratory with the serum of animals immune to cholera suis, in 1892, and again with those immune to cholera suis and swine plague germs, published in August, 1896, showed that these two diseases of swine which cause such enormous losses to the farmers of the country could be cured in experimental animals. Accordingly, practical field experiments were tried, which demonstrated that sick herds could be greatly benefited and a large portion of the animals cured if they were given injections of sufficiently strong serum that had been carefully prepared for the purpose of curing the two diseases above mentioned. The expense of this method if legitimately conducted is comparatively small, and it is possible to prepare a serum that would have the desired curative effect which should not cost more than 10 cents for each injected animal. Further practical experiments on a more extensive scale will be conducted, but the

results so far indicate that antitoxic serums, which have been of such inestimable value to the health of man in many diseases, may prove very valuable to the farmers.

Professor O. P. Hay spoke on 'The Protospondyli and Ætheospondyli of A. S. Woodward,' stating that the suborders of Mr. Woodward were not natural and that the families Semionotidæ and Pycnodontidæ should be removed from the group typified by *Amia* and placed among the families whose modern representative is *Lepisosteus*.

Dr. Theo. Gill spoke on 'The Classification of Astacoidean Crustaceans,' saying that the crayfish are of more than ordinary interest because since the appearance of Huxley's 'Introduction to the Study of Zoology' they have been largely used in laboratories for purposes of instruction. In connection with a university course, the speaker had occasion to investigate the group, and found differences of opinion among recent authors respecting various questions. Such are the limits of the superfamily, the limits of the families, the gradation of the families, or which is the most specialized, the origin of the different types, the nomenclature of the genera and of the families and superfamily. He had been led by his studies to results somewhat different from others in the aggregate, but agreed in almost all points with some one of the previous investigators. In his opinion the name *Astacoidea* of Dana may be retained as the name of a superfamily containing four families, which may be called *Eryonidæ*, *Homaridæ*, *Parastacidæ* and *Astacidæ*. Reasons for the adoption of the families, as well as for their sequence and nomenclature, were given. Special emphasis was placed on the development and degrees of approximation of the generative organs as indications of divergence and specialization.

F. A. Lucas,
Secretary.

GEOLOGICAL SOCIETY OF WASHINGTON, FEBRUARY 23, 1898.

One of the communications was by Mr. H. W. Turner, U. S. Geological Survey, and was on the 'Origin of Yosemite Valley.'

The rocks surrounding the Yosemite Valley are chiefly granites and gneisses. These rocks, originally all massive, have been subjected to stresses resulting in the development of sets of partings, two of which are vertical, crossing each other at approximately right angles; another set horizontal, and two or more diagonal sets. At no place are all of these partings, which would be called by some a joint structure, equally developed. It is the rule that in the neighborhood of the valley a set of vertical partings running nearly parallel with the valley are most prominently developed. These are seen particularly well on a spur at the west end of the valley, at Cathedral Spires and at Sentinel Rock. What is probably another set extends up the spur east of the valley, passing just north of the Half Dome. At Yosemite Falls likewise a set of nearly vertical partings may be noted, although these are not readily seen from the valley below. Nearly all the topographic forms about the valley are dominated by these structure planes. To the vertical partings are due the vertical walls, and to the diagonal partings some of the inclined surfaces, like those of the Three Brothers. The domes of the valley are considered as due to exfoliation by weathering. Such exfoliation only takes place where a mass of the granite is not divided by joint structure. The vertical north face of the Half Dome is believed to be due to the vertical partings, the granite having broken off in slabs from time to time as the base was undermined by erosion, while the mass constituting the Half Dome, being comparatively free from partings, has become rounded by exfoliation of successive shells of weathered rock.

The Yosemite Valley is regarded as a widened portion of a river canyon, the upper portion of which is now occupied by Tenaya Creek. It is believed that river erosion had excavated a canyon here before the valley was occupied by a glacier. The small amount of débris in the valley along the base of the vertical cliffs is due to all the taleus having been removed by glacial ice. It should be remembered, however, that the exact form of the rock bottom of the valley is not known, inasmuch as the glacier, when retreating, left moraines at the west side of the valley which acted as a barrier, causing a temporary lake to form. The final result of this

was the deposit of a large amount of sediment, chiefly gravel and sand, which forms the present floor of the valley.

The other communication was on the Tertiary of South Dakota and Nebraska, by Mr. N. H. Darton, U. S. Geological Survey.

This communication, which was illustrated by lantern slides, set forth the results of recent stratigraphic studies covering Nebraska west of the 103d meridian and the adjacent area in the Big Bad Lands of South Dakota. Several great overlaps and unconformities were discovered which explain variations in fauna of the Neocene formations in different portions of the region. The White River series was found to be overlain southward in Pine Ridge and the Platte Valley by one, and in places two, formations which had hitherto not been differentiated. New light was obtained on relations of the Loup Fork beds of the northwestern Nebraska region to the Tertiary grit, etc., of the Kansas region. Account was given of the great sheets of volcanic ash interbedded at five horizons from the White River formation to early Pleistocene. The Dæmonelix beds were studied and much attention given to the underground water resources.

WM. F. MORSELL.

TORREY BOTANICAL CLUB, JANUARY 26, 1898.

THE first paper, 'New Sapindaceæ from South America,' was by Dr. Radlkofer, of Munich, and presented by Professor Burgess. It contained descriptions of *Urvillea*, *Serjania* and *Paullinia*, soon to be printed in the *Bulletin*. Their type specimens were exhibited, forming part of a collection made by Dr. Rusby in Bolivia.

The second paper, by Dr. J. K. Small, 'The genus *Bumelia* in the Southern States,' described the distinctive characters of 13 species, 5 of which had been before recognized. Discussion on specific limitation followed, President Brown, Dr. Britton, Dr. T. F. Allen, Dr. Small, Dr. Underwood, Professor Lloyd and the Secretary participating.

Dr. Britton spoke of cultivation in the Botanic Garden at Bronx Park as having already settled some questions of specific limits. Mr. Nash has, in this way, proved *Potentilla Canadensis* and *P. simplex* to be distinct, also the European *Pyrola rotundifolia* and the American species long so known.

The third paper was by Dr. N. L. Britton, 'Remarks on some species of *Senecio*,' with exhibition and discussion of illustrative specimens, and of several new species, soon to be printed. One species from White Sulphur Springs is one of three plants on Kate's Mountain, which find their nearest relatives on the Rockies, 1500 miles distant.

Discussion followed on the respective value to be assigned to different characters. Dr. Britton held that absence of rays is an uncertain distinction in *Senecio* and that involucral characters are more permanent. The Secretary remarked on the failure of achene characters in *Aster*, and Dr. Britton upon the same in *Helianthus*. Professor Lloyd remarking that *a priori* we should expect to find greatest variation in organs like leaves which are in direct contact with their environment, Dr. Britton said that though leaves vary much in form they vary but little in assimilation-tissues, their special character.

EDWARD S. BURGESS,
Secretary.

ENGELMANN BOTANICAL CLUB.

THE Club met at the Shaw School of Botany, February 10th, seventeen members present. Mr. Colton Russell read a paper on the topography and ecology of the Archean region of Missouri, and briefly described the different floral districts. He showed what an interesting field is here presented for the study of plants in relation to soil, humidity, exposure, etc. This region, sometimes picturesquely called the Missouri Island, is an ancient granitic outcrop in the southeastern part of the State, and contains rather extended sandstone areas. It is surrounded by a vast extent of limestone country. He exhibited specimens of rare and local plants, also specimens of rocks and soil. Five new members were elected.

The Club met again on February 24th, thirty-two members present. Mr. J. B. S. Norton read some biographical notes on the late Dr. J. F. Joor, whose herbarium recently became the property of the Missouri Botanical Garden.

Dr. Joor was an enthusiastic collector of Southern plants. Owing to ill-health he was rather reserved, but his zeal for his chosen pursuit knew no bounds. His collections were made chiefly about New Orleans, southern Louisiana and eastern Texas. Mr. H. von Schrenk exhibited some specimens of *Smilax bona-nox* covered with numerous hairs. These hairs seem to occur on this plant only in dry exposed places. He spoke briefly on the spines of *Xanthoxylum clavi-Hercules*, which at first grow on the epidermis of the stem, but are pushed out as the twig grows older by a layer of cork. A new cork layer is added each year, larger in area than the preceding one, so that at the end of a period of years the spine stands at the apex of a cork pyramid an inch or more in height. Mr. Walter Retzer spoke on some features of tricotyledonous plants, exhibiting seedlings of the following plants with three cotyledons: *Trifolium repens*, *Celosia cristata*, *Cosmos bipinnatus*, *Ilex Dahoon*, *Antirrhinum major*, *Verbena hybrida*, *Dianthus chinensis*. Four new members were elected.

Hermann von Schrenk,
Secretary.

SCIENTIFIC JOURNALS.

The *American Journal of Science* for March contains a short but important paper by Professor Michelson describing a spectroscope without prisms or gratings. With only twenty elements consisting of optical glass 5 mm. thick, the resolving power would be 100,000, which is about that of the best gratings. Professor Michelson has tried the experiment with seven elements and found that the Zeeman effect could be readily observed. The number contains a paper by Mr. N. H. Darton on 'Geothermal data from deep Artesian Wells of Dakota,' read at the recent meeting of the Geological Society of America, and an abstract, entitled 'Auriferous Conglomerate of the Transvaal,' by Mr. G. F. Becker of his paper published in the last report of the U. S. Geological Survey.

The March number of *Appleton's Popular Science Monthly* contains as frontispiece a portrait of Lord Lister, which is accompanied by a sketch of his life and work. The important series of Lowell Institute lectures on the Racial Geography of Europe, by Dr. Wm. Z. Ripley, is completed in the present number with the 14th part entitled 'Urban Problems.' The first article is an illustrated account of 'The African Sahara by Professor Angelo Heilprin.' The number also contains an account of the St. Louis Academy of Natural Sciences, by Professor Frederick Starr, and several other articles of interest.

In addition to the usual articles on Arctic exploration, birds and the Klondike, the popular magazines contain several contributions of interest to men of science. Under the title 'A National Seminary of Learning,' Dr. W J McGee reviews in *Harper's* the work of the scientific institutions and bureaus of Washington as realizing, to a great extent, Washington's wish for a great national university, and in the same journal Mr. H. S. Williams continues his series of articles on science, reviewing anatomy and physiology. The second of a series of articles in the *Cosmopolitan* on the choice of a profession is by Professor E. S. Holden, and reviews the opportunities offered by science to young men. In this connection may also be mentioned an article in the *Homiletic Review* on 'The Value of a Scientific Education for the Pulpit.'

The *School Science Review*, a monthly journal 'devoted to science for the teachers in the common schools,' has begun publication at Granville, Ohio, succeeding *The Examiner*, of which two volumes had previously been published. The journal is edited by Mr. W. W. Stockberger, of the Doane Academy, Granville, assisted by Messrs. E. E. Richards and C. S. Hoskinson. Such journals indicate a growing interest in the study of science in the schools, and have a mission of increasing importance to perform.

Herr S. Karger, Berlin, announces the publication, beginning with the present year, of a *Jahresbericht über die Leistungen und Fortschritte auf dem Gebeite der Neurologie und Psychiatrie*, edited by Drs. Mendel, Flatau and Jacobsohn, with the cooperation of a number of specialists.

A *Dermatologisches Centralblatt*, on the usual lines of German Centralblätter, has begun publication from the house of Veit & Comp. Leipzig. It is edited by Dr. Max Joseph, Berlin.